

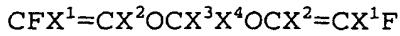
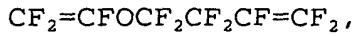
CLAIMS.

1. Tetrafluoroethylene (TFE) thermoprocessable copolymer microspheres having a substantially spherical shape for at least 95% by weight, the average size of the microspheres being in the range 25 μm -2 mm, the bulk density being in the range 0.5-1.1 g/cm³, preferably 0.55-1.0 g/cm³.
2. Microspheres according to claim 1, wherein in the TFE thermoprocessable copolymers the comonomers are selected from:
 - C₃-C₈ perfluorolefins, such as hexafluoropropene (HFP);
 - C₂-C₈ hydrogenated fluoroolefins, such as vinyl fluoride (VF), vinylidene fluoride (VDF), trifluoroethylene, hexafluoroisobutene, perfluoroalkylethylene $\text{CH}_2=\text{CH}-\text{R}_f$, wherein R_f is a C₁-C₆ perfluoroalkyl;
 - C₂-C₈ chloro- and/or bromo- and/or iodo-fluoroolefins, such as chlorotrifluoroethylene (CTFE);
 - CF₂=CFOR_f (per)fluoroalkylvinylethers (PAVE), wherein R_f is a C₁-C₆ (per)fluoroalkyl, for example CF₃, C₂F₅, C₃F₇;
 - CF₂=CFOX (per)fluoro-oxyalkylvinylethers, wherein X is: a C₁-C₁₂ alkyl, or a C₁-C₁₂ oxyalkyl, or a C₁-C₁₂

(per)fluoro-oxsyalkyl having one or more ether groups;

- fluorodioxoles, preferably perfluorodioxoles;

- non conjugated dienes of the type:



wherein X^1 and X^2 , equal to or different from each other, are F, Cl or H; X^3 and X^4 , equal to or different from each other, are F or CF_3 , which during the polymerization cyclopolymerize;

- hydrogenated olefins, preferably in addition to the above mentioned comonomers.

3. Microspheres according to claims 1-2, wherein the TFE thermoprocessable copolymers are both semicrystalline and amorphous-vitrous.

4. Microspheres according to claims 1-3, wherein in the semicrystalline thermoprocessable copolymers the comonomer amount is between about 0.05 and 18% by weight, preferably 0.5 and 10% by weight.

5. Microspheres according to claims 1-4, wherein the thermoprocessable copolymers are selected from:

- FEP copolymers, i.e. tetrafluoroethylene-hexafluoropropene (TFE/HFP) copolymers;

- FEP copolymers modified with a third monomer, for exam-

ple TFE/HFP/PEVE (perfluoroethylvinylether) copolymers;

- TFE/HFP/PMVE (perfluoromethylvinylether) copolymers;
- TFE/HFP/PPVE (perfluoropropylvinylether) copolymers.

6. Microspheres according to claim 5, wherein the HFP amount is about 5-10% by moles, while the perfluoroalkylvinylether amount is between about 0.2 and 3% by weight.

7. Microspheres according to claims 1-4, wherein the thermo-processable copolymers are selected from:

- TFE/PPVE copolymers;
- copolymers TFE/PMVE/fluorinated monomer, preferably PPVE, wherein the PMVE amount ranges from 0.5 to 13% by weight, the fluorinated monomer amount ranges from 0.5 to 3% by weight.
- copolymers TFE/PMVE/fluorinated dioxole wherein PMVE is in the range 0.5%-13% by weight, the fluorinated dioxole is in the range 0.05%-3% by weight.

8. Microspheres according to claim 7, wherein the fluorinated dioxole is 2,2,4-trifluoro-5-trifluoro-methoxy-1,3-dioxole (TTD).

9. Equipment formed by the coagulation apparatus having a cylindrical shape of Figure 1, where the reference numbers show:

- (1) Jacket for maintaining the temperature in the coagulation apparatus at a desired value;

- (2) Outlet of the coagulated product;
- (3) Coagulant inlet;
- (4) Latex inlet;
- (5) Filter;
- (6) Liquid outlet.

10. A process for obtaining the microspheres according to claims 1-8, wherein the equipment of claim 9 is used.

11. A process according to claim 10, wherein in the initial conditions the coagulation apparatus is free from air, filled with water and a coagulant selected from acids, bases and salts.

12. A process according to claims 9-11, wherein when the steady state is reached, the polymerization latex is continuously fed to the semi-continuous coagulation apparatus; separately a coagulant is fed continuously, while the water is taken in a continuous way from the upper part of the coagulation apparatus by a filter.

13. A process according to claims 9-12, wherein the temperature is in the range 5°-90°C, preferably 15°-70°C; the mixing rate ranges between 5 and 25 rps, preferably 10 and 20 rps.

14. A process according to claims 9-13, wherein the latex and the coagulant are fed at least in two steps, preferably in three steps.

15. A process according to claim 14, wherein:
 - in the first step the polymer concentration of the latex ranges from 25 g/litre to 300 g/litre, preferably 50-200 g/litre; the latex feeding flow-rate is in the range 5 l/hour-45 l/hour; the time of this step is lower than 10 minutes;
 - the second step is optional and consists in ending the nucleation, preferably by feeding a polymer flow-rate corresponding to 10% of that fed in the first step;
 - in the third step the polymer concentration of the fed latex is between 25 g/litre and 300 g/litre, preferably between 50 and 200 g/litre; the latex feeding flow-rate is in the range 5 l/hour-30 l/hour; the time of this step is higher than 15 minutes.
16. A process according to claims 9-15, wherein after a total residence time comprised between about 25 minutes and 10 hours, the fluoropolymer microspheres are discharged in a discontinuous way from the bottom of the coagulation apparatus; subsequently the microspheres are subjected to a drying step at a temperature in the range 170°-280°C.
17. Use of the microspheres according to claims 1-8 in powder coating and flame spraying applications.
18. Use of the microspheres according to claims 1-8 in rotomoulding and rctolining applications.

19. Use of the microspheres according to claims 1-8 as inert support in chromatographic separation columns in gaseous or liquid phase.